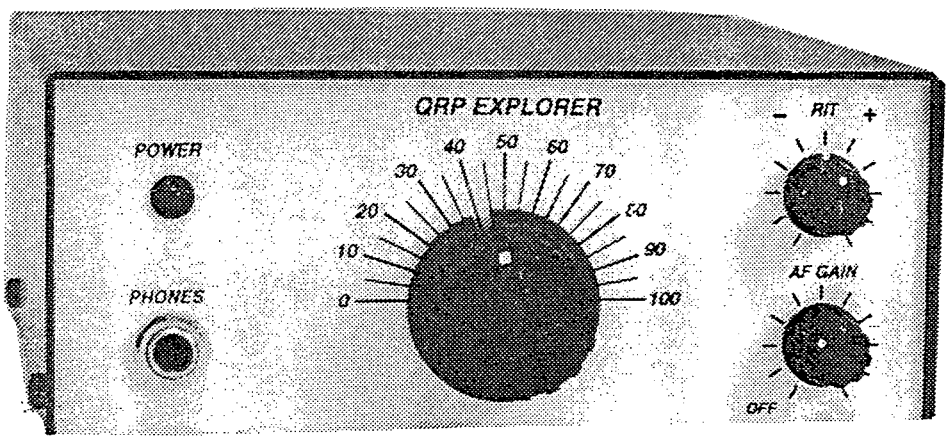
ASSEMBLY INSTRUCTIONS

QRP EXPLORER

40m



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Introduction

Thank you for purchasing the QRP Explorer transceiver kit. The Explorer is a basic single band superhet transceiver offered for the 80, 40, 30 and 20M bands. It features a very stable VFO circuit with a vernier dial providing 100 KHz of coverage (50 KHz on 30M); RIT circuit providing ± 1.5 KHz of range; four pole crystal ladder filter; AGC circuit; sidetone oscillator with level control; silky smooth QSK circuit; 2 - 3 watts of RF output on all bands. The current drain on RX is 50mA and 450mA on TX. All coils are pre-wound for your convenience. The 80 and 40M versions can easily be set up to operate in the Novice portion of the band. The transceiver is constructed on a single, double-sided PC board with plated-thru holes and component screen. There are no jumpers to install on the board. The alignment is very easy to perform and requires only a 10 MHz frequency counter with a 10:1 probe, voltmeter, QRP wattmeter and 50 ohm dummy load and your main station transceiver.

You will need the following tools to assemble your kit: normal hand tools which include long-nose pliers; diagonal cutters; GOOD wire strippers; phillips screwdriver; small bladed regular screwdriver; pliers; .050" Allen wrench; 25 watt pencil type soldering iron; ruler; magnifying glass; supply of ROSIN CORE solder. A desoldering bulb and desoldering braid are also helpful to have.

Soldering is one of the most important operations you will perform while assembling your kit. About 95% of all kits returned to us for repair have problems caused by poor soldering. A good solder connection will form an electrical connection between two parts, such as a component lead and a circuit board foil. A bad solder connection will prevent an otherwise well assembled kit from operating properly. It is easy to make good solder connections if you follow a few simple rules. Use the correct type of soldering iron. A 25 watt pencil soldering iron with a 1/8" or 3/16" chisel tip works well. Keep the soldering iron tip clean. Wipe it often on a wet sponge or cloth; then apply solder to the tip to give the entire tip a wet look. This process is called tinning, and it will protect the tip and enable you to make good solder connections. When solder tends to "ball" or does not stick to the tip, the tip needs to be cleaned and retinned. ALWAYS USE ROSIN CORE, radio type solder (60:40 tin-lead content) for all the soldering in this kit. The warranty will be void and we will not service any kit in which acid core solder or paste has been used.

ASSEMBLY NOTES

The parts list contains a KEY # and REF DES #. Use the KEY # and the parts pictorial sheets to help identify parts. The REF DES # is used on the schematic diagram and PC board to identify individual parts. Some parts may be supplied on a tape. Use your cutters to cut the component leads from the tape. Never pull the components from the tape. All components are mounted on the component screen side of the board. All horizontal mounted components are positioned down against the board.

The PC board supplied with this kit is double-sided with plated thru holes. When you assemble the board, BE ABSOLUTELY SURE YOU HAVE THE CORRECT COMPONENT IN THE CORRECT LOCATION BEFORE SOLDERING IT IN PLACE! DOUBLE CHECK YOUR WORK BEFORE SOLDERING! With plated-thru holes, once you have soldered a component in place, and then want to remove it, it is more difficult. If you do make a mistake and want to remove a component, follow this simple procedure. Use your desoldering bulb and desoldering braid to remove ALL solder from the holes. Make sure the component leads are loose and free in the holes before removing the component. Use care when handling the cabinet parts. Some may have sharp edges. You should wear eye protection to prevent a cutoff lead clipping from flying up into your eye. As you cut component leads, hold on to the lead as you cut it.

The QRP Explorer is not difficult to build. Just take your time and use common sense. Don't work too long at one time. Take frequent breaks. Take the time now to read through all the steps in this booklet before beginning construction of your kit. This will help you become familar with the kit and may help prevent mistakes.

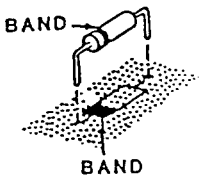
BOARD ASSEMBLY (40M)

( ) In this step you will unpack the parts. Some parts are shipped in separate marked packages. Do not remove these parts from their packages until you are instructed to install them. Unpack the parts and take inventory. Use the parts pictorial sheet and parts list to identify parts. As you check parts off, it is very helpful to lay out the parts in groups, resistors in one group, caps in another group and so on.

( ) Locate the PC board and position it in front you with the white component screen up and C1 at the upper left corner. The REF DES #'s start at the left and generally run left to right. When you install components on the board, bend the leads as necessary and place in the correct holes. Then on the solder side of the board bend leads slightly to hold part in place. You may install four or five components at a time and solder and trim the leads. Resistors, caps and diodes are installed in this manner. Other parts are generally installed one at a time. Use the parts list and component screen diagram to identify the parts and their location on the board. All resistors are mounted vertically. See drawing at right.

(✓) When you install diodes, be sure to position the banded end as shown on the board. All diodes are positioned down against the board.

(✓) Install 1N4148 diodes at D1, D2, D4, D5, D6 & D8.



(✓) Solder and trim leads.

(✓) Install the 5.6V zener diode at D10.

(✓) Install the 6.8V zener diode at D7.

(✓) Install the 5W 36V zener diode at D3.

(✓) Solder and trim leads.

(✓) Install 11mhz crystals at Y1, Y2, Y3, Y4, Y5 & Y6. Solder and trim leads.

BOARD ASSEMBLY (40M)

( ) In the next step you will install the IC sockets. Be sure to match up the half-moon notch at one end of the socket with the half-moon pattern on the board. It is best to install and solder each socket one at a time.

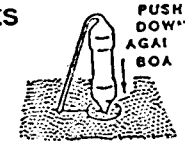
( ) Install 8 pin IC sockets at U1, U2, U3, U4, U5, U6, U7 & U8. Be sure each pin is soldered.

( ) Install a 10µH choke (brn-blk-blk) at L4. This choke is positioned down against the board. Solder and trim leads.

( ) Install a 15µH choke (brn-grn-blk) at L5. This choke also is positioned down against the board. Solder and trim leads.

( ) Install 15µH chokes (brn-grn-blk) at L6 and L9. These two chokes are mounted vertically. See drawing at right. Solder and trim leads.

( ) In the next step you will install the resistors. Remember, all resistors are mounted vertically. DO NOT ATTEMPT TO INSTALL THE RESISTORS HORIZONTALLY! See drawing above. Refer to the parts list for the value, color code and location of each resistor. You may install four or five resistors at a time, then solder and trim the leads. Check off each resistor as you install them.



( ) Refer to the parts list and install the resistors. Please note that R55 (4.7KΩ) is not mounted on the board. It is chassis mounted.

( ) Install a 100Ω (101) trim pot at R3. Solder leads.

( ) Install a 100KΩ (104) trim pot at R32. Solder leads.

( ) Install a 10KΩ (103) trim pot at R39. Solder leads.

( ) Install an ORG trim cap at C7 and C58. Solder leads.

( ) Install a BLK trim cap at C15 and C39. Solder leads.

( ) In the following steps you will install the NP0 mono caps. All these caps have .1" lead spacing.

BOARD ASSEMBLY (40M)

( ) Use your magnifying glass to help identify the small NP0 mono caps. Install an 1pF (109) NP0 mono cap at C45 and C52. These caps will drop into the holes and rest on top of the board. Solder and trim leads.

( ) Install 47pF (470) NP0 mono caps at C14 & C38. Solder and trim leads.

( ) Install a 39pF (390) NP0 mono cap at C55. Solder and trim leads.

( ) Install 82pF (820) NP0 mono caps at C29 and C36. Solder and trim leads.

( ) Install a 2.7pF (279) NP0 mono cap at C30. Solder and trim leads.

( ) Install 330pF (331) NP0 mono caps at C54 and C62. Solder and trim leads.

( ) Install 470pF (471) NP0 mono caps at C63 and C65. Solder and trim leads.

( ) Install a 560pF (561) NP0 mono cap at C64. Solder and trim leads.

( ) Install a 100pF (101) NP0 mono cap at C57. Solder and trim leads.

( ) Install 1000pF (102) NP0 mono caps at C46 & C56. These caps are yellow in color. DO NOT use the blue colored caps at C46 or C56. Solder and trim leads.

( ) In the following steps you will install the ceramic disc caps. These have .2" lead spacing and are TAN in color .

( ) Install a 10pF (10J) ceramic disc cap at C67. Solder and trim leads.

( ) Install a 5pF (5J) ceramic disc cap at C8. Solder and trim leads.

( ) Install an 47pF (47J) ceramic disc cap at C3. Solder and trim leads.

BOARD ASSEMBLY (40M)

( ) Install a 22pF (22J) ceramic disc cap at C25 and C48. Solder and trim leads.

( ) Install a 150pF (150J) ceramic disc cap at C9. Solder and trim leads.

( ) Install .001µF (102) mono caps (blue) at C40 and C59. Solder and trim leads.

( ) Install .01µF (103) ceramic disc caps at C19, C53 and C61. Solder and trim leads.

( ) Install .1µF (104) mono caps at C5, C6, C11, C16, C20, C23, C24, C26 and C31. Solder and trim leads.

( ) Install .1µF (104) mono caps at C35, C42, C44, C47, C49, C50, C51 and C60. Solder and trim leads.

( ) Install a 1µF (105) mono cap at C43. Solder and trim leads.

( ) Install a .033µF (333) polyester cap at C32. Solder and trim leads.

( ) Install a .022µF (223) polyester cap at C37. Solder and trim leads.

( ) Install a 270pF (270J) ceramic disc cap at C4. Solder and trim leads.

( ) Install a 680pF (680J) ceramic disc cap at C2. Solder and trim leads.

( ) Install a 330pF (330J) ceramic disc cap at C1. Solder and trim leads.

( ) In the following steps you will install the electrolytic caps. The long lead is always POSITIVE. Be sure to install these caps with the long lead in the hole marked (+).

( ) Install a .47µF electrolytic cap at C12 and C13. Solder and trim leads.

( ) Install a 1µF electrolytic cap at C33 and C34. Solder and trim leads.

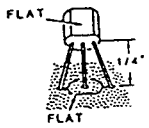
( ) Install a 10µF electrolytic cap at C17 and C18. Solder and trim leads.

BOARD ASSEMBLY (40M)

( ) Install a 22µF electrolytic cap at C10, C27, C28 and C41. Solder and trim leads.

( ) Install a 220µF electrolytic cap at C21 and C22. Solder and trim leads.

( ) In the following steps you will install the TO-92 style transistors, varactor diode and the 9V regulator. Be sure to position the flat side as shown on the board. Also, position the bottom of the device about 1/4" above the board. See drawing at right.



( ) Install the MV2109 varactor diode at D9. Solder and trim leads.

( ) Install the 78L09 regulator at U9. Solder and trim leads.

( ) Install the J310 transistor at Q3. Solder and trim leads.

( ) Install a MPF102 transistor at Q4, Q6 and Q8. Solder and trim leads.

( ) Install the 2N3904 transistor at Q9. Solder and trim leads.

( ) Install the 2N3906 transistor at Q7. Solder and trim leads.

( ) Install the 2N2907A transistor at Q5. Be sure to line up the small tab on the transistor with the tab on the board. Position this transistor about 1/8" above the board. Solder and trim leads.

( ) Slide a small white spacer onto the leads of the 2N3866 transistor. Install at Q2. Position the spacer and transistor down against the board. Solder and trim leads. Slide the RED heatsink onto the transistor.

( ) Slide a small white spacer onto the leads of the 4013 transistor. Install at Q1. This transistor is also positioned down against the board. Solder and trim leads. Do not install the heatsink at this time.

( ) Remove the coil from the package labeled L3. Install the coil vertically at L3. Solder and trim leads.

( ) Remove the coils from the package labeled L1 & L2. Install the coils vertically at L1 & L2. Solder and trim leads.

BOARD ASSEMBLY (40M)

( ) Remove the transformer from the package labeled T1. Identify the two RED leads and the two GREEN leads. Insert the two RED leads into the holes labeled "R" and the two GREEN leads into the holes labeled "G". Keep the transformer in a vertical position and remove any excess slack in the wires. Solder and trim leads.

( ) Remove the coil from the package labeled L12. Install at L12. Solder all pins including the ground tabs.

( ) Remove the coils from the package labeled L7 & L8. Install at L7 & L8. Solder all pins including the ground tabs.

( ) Install the two remaining coils (42IF123) at L10 & L11. Solder all pins including the ground tabs.

( ) Locate the grey 10 conductor cable. Use your diagonal cutters to cut the grey jacket back about 1/2" from one end to expose the wires. Start pulling the wires from the grey jacket one at a time until all wires are removed. Discard the grey jacket. These wires will be used for all wiring in the radio. Cut the following wires to the indicated lengths.

BLK	3"
BRN	7"
RED	10 1/4"
ORG	7"
YEL	3 1/2"
GRN	3"
BLU	7"
VIO	4 1/2"
GRY	9"
WHT	3"

( ) In this step you will prepare the cut wires by removing 1/4" of insulation from each wire. Be sure to use a GOOD quality pair of wire strippers. DO NOT USE A KNIFE, RAZOR BLADE OR DIAGONAL CUTTERS TO REMOVE THE INSULATION! If you cut or nick the wire strands you will be constantly repairing broken wires. Remove 1/4" of insulation from both ends of each wire.

BOARD ASSEMBLY (40M)

( ) Install the prepared wires at the indicated board locations. It is best to install the wires one at a time. Solder each wire as it is installed.

3" BLK	R53 (1)
3" WHT	R53 (2)
3" GRN	R53 (3)
3 1/2" YEL	KEY
7" BRN	R12 (1)
7" ORG	R12 (2)
7" BLU	R12 (3)
4 1/2" VIO	12V

The other wires will be connected later.

( ) Locate the short length of LARGE RED wire. Cut it to a length of 1 1/4". Remove 1/4" of insulation from each end. Install one end in the hole labeled "C66". Solder and trim.

( ) Locate the length of black miniature coax cable. Cut a 9" and 2 1/2" length. Refer to the pictorial sheet, Fig 2 and prepare each cable as shown. Be very careful when removing the insulation. Do not cut into the braid or inner conductor.

( ) Install one end of the 9" cable at the board location labeled "PHONES". The braid goes in the larger hole.

( ) Install one end of the 2 1/2" cable at the location labeled "ANT".

( ) Refer to the pictorial sheet, Fig 3 and prepare each IC for installation in the sockets.

( ) When you install an IC in its socket, be absolutely sure you have the half-moon or notch matched up with the half-moon on the board and socket. Install the Ics as follows:

U1, U6, U7	NE602AN
U2, U4	NE5534N
U3	LM380N-8
U5	LM358N
U8	MC1350P

( ) Double check to be sure you have the Ics in the correct locations and that they are positioned correctly.

BOARD ASSEMBLY (40M)

( ) Install the large black heatsink on transistor Q1.

( ) Lightly tin the free ends of all wires and cables.

( ) This completes the assembly of the PC board. All components, wires and cables should now be installed, soldered and trimmed. Check the solder side of the board for any unsoldered connections or solder bridges. Set the board aside for now.

CHASSIS ASSEMBLY & FINAL WIRING

( ) Refer to Figs 1 & 4 for the following steps. Position the chassis as shown. Mount aluminum spacers at holes A, B, E and F as shown. Use 4-40 x 1/4" screws and #4 lockwashers. Leave the spacers finger tight for now. Position the PC board over the spacers and line up the holes in the board with the holes in the spacers. Start a 4-40 x 1/4" screw into each of the spacers. Tighten these four screws. Turn the chassis over and tighten the four screws holding the spacers. Remove the four PC board mounting screws and set the PC board aside for now.

( ) Place a #6 lockwasher on the 6-32 x 5/8" screw. From the inside of the rear panel, insert the screw through the hole labeled GND. Secure with a #6 lockwasher and #6 nut and tighten.

( ) Place a #4 lockwasher on a 4-40 x 1/4" screw. From the outside of the rear panel insert the screw through hole G. On the inside of the rear panel, install a three lug terminal strip. Secure with a #4 lockwasher and nut. Position terminal strip as shown and tighten nut. You can label this terminal strip TB1.

( ) From the outside of the rear panel place the SO-239 antenna connector through the hole labeled ANT. Line up the four holes and secure with 4-40 x 5/16" screws and #4 lockwashers and nuts. Install and position a #4 solder lug as shown in the drawing. Tighten all four screws.

( ) Remove the flat washer and nut from the 1/4" key jack. Install the jack in the rear panel hole labeled KEY. Secure with the supplied hardware. Position the jack as shown. Tighten nut.

CHASSIS ASSEMBLY & FINAL WIRING

(1) Refer to Fig 4. Install the coaxial power jack J4 in the rear panel hole labeled "13.6V". Position the jack so the terminals are postioned as shown. Tighten the nut. Install the #6 solder lug in the hole labeled "GND". Use a 6-32 x 5/8" screw, #6 lockwasher and a large #6 hex nut. Position the lug as shown. Tighten nut.

(1) Locate the air variable cap, C66. Place the shaft through the large hole in the front panel. Line up the two machined holes with holes C & D in the chassis. Start a 4-40 x 1/4" screw and #4 lockwasher in each hole. Be sure cap shaft is centered in large hole and tighten screws.

(1) Position the PC board over the four spacers so the heatsinks are near the rear panel. Start a 4-40 x 1/4" screw and #4 lockwasher at each board mounting hole. Tighten all four screws.

(1) Place a gentle loop in the large RED wire coming from board hole labeled "C66". Engage the end of the wire into the nearest terminal hole of the air variable cap. Insert the wire in the hole just far enough to be able to make a good solder connection. Be sure the wire end is not shorting to the chassis. Now solder the connection.

(1) Locate the audio gain pot, R12. Remove the nut and washer. Break off the small alignment tab on the front edge. Install the pot in the front panel hole labeled "AF GAIN". Position the pot as shown and secure with the supplied hardware. Tighten nut.

(1) Install and solder wires to the AF gain pot as follows:
BRN - lug 1; ORG - lug 2; BLU - lug 3; GRY - lug 4; previously prepared 10 1/4" RED - lug 5.

(1) Locate the center detent pot, R53. Remove the nut and flatwasher. Break off the small alignment tab. Install the pot in the front panel hole labeled "RIT". Position as shown in the drawing and secure with supplied hardware. Tighten nut.

(1) Install and solder wires to R53 as follows: BLK - lug 1; WHT - lug 2; GRN - lug 3.

(1) Remove the nut and flat washer from the remaining 1/4" phone jack. Install the jack in the front panel hole labeled "PHONES". Position the jack as shown and secure with the supplied hardware. Tighten nut.

CHASSIS ASSEMBLY & FINAL WIRING

( ) Connect the free end of the coax cable coming from the PC board holes labeled PHONES as follows: Braid - lug 1; Inner conductor - lug 3. Solder both connections.

( ) Remove the PC board mounting screw at the left front corner near L11. Install a three lug terminal strip at this location. Position as shown in Fig 4. Replace the removed mounting screw. This terminal strip can be labeled TB2.

( ) Install but do not solder a 4.7KΩ (yel-vio-red) 1/4W resistor between lugs 2 & 3. Connect the RED wire and the VIO wire to TB2 lug 3. Solder the connection.

( ) Locate the panel mount LED assembly. Cut the RED lead to 2" and the WHITE lead to 1 1/2" in length. Remove 1/4" of insulation from each lead. Insert the leads through the front panel hole labeled "POWER". Push the black housing into the hole until it is seated in place. Connect and solder the RED lead to TB2 lug 2. Connect and solder the WHITE lead to TB2 lug 1.

( ) Cut both leads of the 1N4007 diode to 1/2". Install but do not solder the 1N4007 diode between lugs 1 & 2 of J4 on the rear panel. The BANDED end goes to lug 1 and the other end goes to lug 2 . See Fig 4 to identify the terminals on J4. Connect the free end of the GREY wire to J4 lug 1. Solder the connection. Connect a 1" bare wire from J4 lug 2 to the near-by solder lug. Use a scrap cut-off lead from a component. Solder both connections.

( ) Connect the YELLOW wire to terminal lug 3 of the KEY jack. Solder the connection.

( ) Connect the free end of the remaining coax cable to the ANT connector as follows: Center conductor to center pin; Braid to solder lug. Solder both connections.

( ) Dress and route the wires and cables as neat as possible above the board and secure with the supplied plastic tie wraps. Keep all wires away from the air variable cap.

( ) Place the brass dial mounting hub on your work table so the flange with the hex set screw is on the table. Position the plastic dial pointer on the larger flange and line up the holes with the machined holes in the flange. Secure with two 2-56 x 1/8" screws

CHASSIS ASSEMBLY & FINAL WIRING

( ) Place the assembled dial flange on the shaft of the air variable cap with the hex set screw toward the cap. Turn the shaft of the air variable cap fully counterclockwise until the plates are fully meshed. Turn the dial pointer so the red cursor line is lined up with the "100" line. The plastic dial pointer should be as close as possible to the front panel without rubbing. Tighten the hex set screw. The mounting flange should be centered in the large hole in the front panel. If it is not, loosen the air variable mounting screws and adjust as necessary. Don't forget to retighten the air cap mounting screws.

( ) Install the large knob on the shaft of the air variable cap. Adjust the knob so the set screw will be tightened on the first section of the shaft. Tighten the set screw.

( ) Set the RIT pot to its center detent position. Place a small knob on the shaft and align the small notch out with the center tick mark. Tighten the set screw. Be sure the back of the knob is not rubbing on the mounting nut.

( ) Turn the AF GAIN pot shaft fully counterclockwise until it clicks. Place a small knob on the shaft and align the small notch out with the "OFF" tick mark. Tighten the set screw. Again, be sure the back of the knob is not rubbing on the mounting nut.

( ) Install the four rubber feet on the bottom of the cabinet. Position the feet about 1/2" in from each corner.

( ) This completes the assembly of the radio. The alignment will be performed next.

ALIGNMENT (40M)

( ) The alignment of this radio is not difficult to perform. If you do not have the proper equipment, Oak Hills Research will align and return the radio to you for a fee of $30.00. This alignment service is for properly assembled units only. We will not accept incomplete kits for alignment. The $30.00 fee must accompany unit to be aligned. If you are going to do your own alignment, continue on to the next step.

( ) The alignment is very easy to perform and will require the following items: A well regulated power supply able to supply 13.6VDC @ 1A; frequency counter with 10:1 probe; voltmeter; QRP dummy load; QRP wattmeter; your main station transceiver, a small screwdriver to adjust the trim caps.

( ) Locate the molded power cable assembly. Examine the end with the tinned leads. Notice that one of the leads has ribs or notches on it and the other has printing on it. The ribbed or notched lead should be POSITIVE and the printed lead should be NEGATIVE. Use your ohmmeter to identify the positive lead. The positive lead is connected to the center pin of the molded plug. After you have identified the positive lead, be sure this lead connects to the positive terminal of your power supply. You may trim the cable to any desired length.

( ) Attach your counter probe to the bare lead of resistor R42. Turn the power supply on. Rotate the AF GAIN control until it clicks. The red LED should be lit. Turn on your frequency counter. Allow everything to warm up for 30 minutes.

( ) Set the RIT control to its center detent position. Set main tuning to "100". Adjust L12 for a frequency of 3900 KHz (3800 KHz). Set main tuning to "0". Adjust C58 for a frequency of 4000 KHz (3900 KHz). Set main tuning to "100". Adjust L12 for a frequency of 3900 KHz (3800 KHz). Set main tuning to "0". Adjust C58 for a frequency of 4000 KHz (3900 KHz). Continue the above procedure until you have exactly 100 KHz of coverage. Note: The frequencies in ( ) are for the Novice portion of the band.

( ) Disconnect the frequency counter probe. Attach the positive lead of your voltmeter to the bare lead of resistor R38 and the negative lead to chassis ground. Adjust pot R39 for a voltage of 4.75VDC. Disconnect the voltmeter.

ALIGNMENT (40M)

( ) Attach your antenna to the antenna jack on the rear panel. Attach your 8Ω headphones to the phones jack. Tune in a signal near the center of the tuning range. Adjust trim cap C39 for a nice sounding tone of about 700 Hz. Be sure you have adjusted the BFO to the correct side of zero beat. To check this, tune in a signal anywhere within the tuning range. As you move the main tuning dial toward "0" the signal should get lower and lower in frequency until you reach zero beat. If the signal goes up in frequency, you have adjusted the BFO on the wrong side of zero beat.

( ) Again, tune in a signal near the center of the dial. Adjust L7 & L8 for maximum signal. Adjust L10 & L11 for maximum signal.

( ) Remove your antenna. Attach a QRP wattmeter and dummy load to the antenna jack. Attach your key to the KEY jack. Adjust pot R3 to mid-range. Set the main tuning dial to about half scale. Key the radio and slowly adjust trim cap C7 for maximum power output on the wattmeter. You should have 2 - 3 watts output. If necessary, adjust R3 until power output is within this range. Move main tuning dial through its entire range while watching the power out. The output power should remain fairly constant.

( ) Attach a separate dummy load to your main station transceiver. If possible, reduce the output power to a low level.

( ) Key your main station transceiver and tune in the signal on the QRP radio. Unkey the main station radio. Now without touching the main tuning dial on either radio, key the QRP radio and adjust trim cap C15 until you hear a nice mellow tone of about 700 Hz in the main station transceiver. Unkey the QRP radio.

( ) Key the QRP radio and adjust pot R32 for a comfortable sidetone level.

( ) Install the cabinet cover and secure with the four #6 black self-tapping screws.

( ) The operation of the QRP Explorer is easy and straightforward. Simply attach your favorite key, a good 50 ohm antenna and your 8 ohm headphones and start enjoying yourself. We hope you have enjoyed building the Explorer and that it provides many years of reliable service.

1 YEAR LIMITED WARRANTY

PARTS - Replacements for defective parts will be supplied free of charge for a period of one year from the date of purchase. Replacement parts are warranted for the remaining portion of the original warranty period. If you do have a defective part, you may obtain a replacement by writing or calling us at (616) 796-0920. We will pay the shipping charges on these parts.

SERVICE LABOR - For a period of one year from the date of purchase, any malfunction caused by defective parts will be corrected at no charge to you. You must deliver the unit at your expense to Oak Hills Research. This warranty does not cover the corrections of assembly errors or any damage incurred during assembly of the unit.

TECHNICAL CONSULTATION - You will receive free consultation on any problem you may encounter in the assembly or use of our product. Just give us a call at (616) 796-0920, we will be glad to assist you.

NOT COVERED - The correction of assembly errors, adjustments, calibration, damage due to misuse, abuse or negligence are not covered by this warranty. Use of corrosive solder will void this warranty in its entirety. This warranty does not include reimbursement for inconvenience, loss of use or customer assembly.

This warranty covers only Oak Hills Research products and is not extended to other equipment or components that a customer uses in conjunction with our products.

EFFECTIVE WARRANTY DATE - Warranty begins on the date of first consumers purchase. Please supply a copy of your invoice when you request warranty service or parts.

SHIPPING UNITS - When shipping a unit back to us for repair, use adequate packing material. Damage due to inadequate packing cannot be repaired under this warranty.

OAK HILLS RESEARCH
20879 Madison Street
Big Rapids, MI 49307
(616) 796-0920

Oak Hills Research
Explorer Parts List
40M

ITEM #	QTY	OHR P/N	DESCRIPTION	DESIGNATOR	MARKINGS	PART ID
23	4 ////	6-104-14	100K ohm 1/4W 5% resistor	R27,R28,R41,R50	BRN-BLK-YEL	
24	1	6-394-14	390K ohm 1/4W 5% resistor	R33	ORG-WHT-YEL	
25	1	6-105-14	1M ohm 1/4W 5% resistor	R5	BRN-BLK-GRN	
26	1	6-155-14	1.5M ohm 1/4W 5% resistor	R22	BRN-GRN-GRN	
27	1	K205	2.7pF NP0 mono cap *	C30	279	A2
28	2	MC01	1pF NP0 mono cap *	C45,C52	~~109~~ 1A	A2
29	2	MC21	82pF NP0 mono cap *	C29,C36	820	A2
30	2	MC18	47pF NP0 mono cap	C14,C38	470 47J	A2
31	1	MC17	39pF NP0 mono cap *	C55	390	A2
32	1	MC22	100pF NP0 mono cap *	C57	101	A2
33	2 //	MC28	330pF NP0 mono cap	C54,C62	331	A2
34	2 //	MC30	470pF NP0 mono cap	C63,C65	471	A2
35	1	MC31	560pF NP0 mono cap	C64	561	A2
36	2	MC34	1000pF NP0 mono cap	C46,C56	102 (COG)	A2
37	2 //	MC100	.001µF mono cap	C40,C59	102 (blue body)	A2
38	17	MC102	.1µF mono cap	C5,C6,C11,C16, C20,C23,C24,C26, C31,C35,C42,C44, C47,C49,C50,C51, C60	104	A2
39	1	MC106	1µF mono cap	C43	105	A2
40	1	NP02	5pF cer disc cap *	C8	5	A3
41	1	K269	10pF cer disc cap	C67	10	A3
42	1	K270	47pF cer disc cap *	C3	47	A3
43	2 //	K271	22pF cer disc cap	C25,C48	22	A3
44	1	K272	150pF cer disc cap *	C9	150	A3

* Denotes parts in band pack

Oak Hills Research
Explorer Parts List
40M

ITEM #	QTY	OHR P/N	DESCRIPTION	DESIGNATOR	MARKINGS	PART ID
1	1	6-279-14	2.7 ohm 1/4W 5% resistor	R21	RED-VIO-GLD	
2	1	6-330-14	33 ohm 1/4W 5% resistor	R2	ORG-ORG-BLK	
3	1	6-470-14	47 ohm 1/4W 5% resistor	R47	YEL-VIO-BLK	
4	3 ///	6-101-14	100 ohm 1/4W 5% resistor	R1,R11,R43	BRN-BLK-BRN	
5	1	6-181-14	180 ohm 1/4W 5% resistor	R42	BRN-GRY-BRN	
6	1	6-221-14	220 ohm 1/4W 5% resistor	R7	RED-RED-BRN	
7	1	6-271-14	270 ohm 1/4W 5% resistor	R49	RED-VIO-BRN	
8	3 ///	6-471-14	470 ohm 1/4W 5% resistor	R15,R25,R40	YEL-VIO-BRN	
9	2 //	6-511-14	510 ohm 1/4W 5% resistor	R4, R6	GRN-BRN-BRN	
10	1	6-561-14	560 ohm 1/4W 5% resistor	R8	GRN-BLU-BRN	
11	1	6-821-14	820 ohm 1/4W 5% resistor	R45	GRY-RED-BRN	
12	6 ///	6-102-14	1K ohm 1/4W 5% resistor	R9,R10,R14,R20, R29,R44	BRN-BLK-RED	
13	1 /	6-182-14	1.8K ohm 1/4W 5% resistor	R48	BRN-GRY-RED	
14	1	6-222-14	2.2K ohm 1/4W 5% resistor	R18	RED-RED-RED	
15	1	6-332-14	3.3K ohm 1/4W 5% resistor	R37	ORG-ORG-RED	
16	3 //	6-472-14	4.7K ohm 1/4W 5% resistor	R24,R34,R55*	YEL-VIO-RED	
17	7 ///	6-103-14	10K ohm 1/4W 5% resistor	R13,R23,R31,R36, R38,R51,R54	BRN-BLK-ORG	
18	1	6-153-14	15K ohm 1/4W 5% resistor	R26	BRN-GRN-ORG	
19	2 //	6-223-14	22K ohm 1/4W 5% resistor	R19,R30	RED-RED-ORG	
20	1	6-273-14	27K ohm 1/4W 5% resistor	R35	RED-VIO-ORG	
21	2 //	6-473-14	47K ohm 1/4W 5% resistor	R46,R52	YEL-VIO-ORG	
22	2 //	6-513-14	51K ohm 1/4W 5% resistor	R16,R17	GRN-BRN-ORG	

* R55 IS NOT BOARD MOUNTED

Oak Hills Research
Explorer Parts List
40M

ITEM #	QTY	OHR P/N	DESCRIPTION	DESIGNATOR	MARKINGS	PART ID
69	1	1N5365B	36V 5W Zener diode	D3		A8
70	1	MV2109	Varactor diode	D9	TO-92 package	A10
71	1	4013	RF transistor	Q1	TO-39 package	B3
72	1	2N3866	RF transistor	Q2	TO-39 package	B3
73	1	J310	J-FET transistor	Q3	TO-92 package	A9
74	3	MPF102	J-FET transistor	Q4,Q6,Q8	TO-92 package	A9
75	1	2N2907A	PNP transistor	Q5	TO-18 package	A13
76	1	2N3906	PNP transistor	Q7	TO-92 package	A9
77	1	2N3904	NPN transistor	Q9	TO-92 package	A9
78	1	78L09	9V Regulator	U9	TO-92 package	A9
79	3	NE602AN	8 pin IC	U1,U6,U7		A11
80	2	NE5534N	8 pin IC	U2,U4		A11
81	1	LM380N-8	8 pin IC	U3		A11
82	1	LM358N	8 pin IC	U5		A11
83	1	MC1350P	8 pin IC	U8		A11
84	8	ICS01	8 pin IC socket			A12
85	6	K018	11 Mhz crystal	Y1,Y2,Y3,Y4,Y5, Y6		A14
86	2	K027	TO-39 transistor spacer			B4
87	1	HS03	TO-39 Ribbed heatsink		RED	B5
88	1	K262	TO-39 Large heatsink		BLACK	B6
89	1	POT1	100 ohm PC trim pot	R3	101	A1
90	1	POT7	10K ohm PC trim pot	R39	103	A1

Oak Hills Research
Explorer Parts List
40M

ITEM #	QTY	OHR P/N	DESCRIPTION	DESIGNATOR	MARKINGS	PART ID
45	1	K273	330pF cer disc cap *	C1	330	A3
46	1	K022	680pF cer disc cap *	C2	680	A3
47	1	K215	270pF cer disc cap *	C4	270	A3
48	3 ///	CD17	.01µF cer disc cap	C19,C53,C61	103	A3
49	1	K108	.022µF Polyester cap	C37	223 (green)	B1
50	1	K109	.033µF Polyester cap	C32	333 (green)	B1
51	2 //	CE01	.47µF Electrolytic cap	C12,C13		B2
52	2 //	CE02	1µF Electrolytic cap	C33,C34		B2
53	2 //	CE06	10µF Electrolytic cap	C17,C18		B2
54	4////	CE07	22µF Electrolytic cap	C10,C27,C28,C41		B2
55	2 //	CE11	220µF Electrolytic cap	C21,C22		B2
56	2	TC11	50pF ceramic trim cap	C7,C58	ORG	A4
57	2	TC12	90pF ceramic trim cap	C15,C39	BLK	A4
58	1	CH13	6.8µH choke *	L4	BLU-GRY-GLD	A5
59	3	CH16	15µH choke *	L5,L6,L9	BRN-GRN-BLK	A5
60	4	1F01	4.7µH transformer	L7,L8,L10,L11	42IF123	A6
61	1	K163	8.0µH coil *	L12	VIO BODY	A6
62	1	K265	Pre-wound toroid coil *	L3		C1
63	2	K044	Pre-wound toroid coil *	L1,L2		C1
64	1	K124	Pre-wound toroid transformer	T1		A7
65	6	1N4148	Silicon diode	D1,D2,D4,D5,D6, D8		A8
66	1	1N4007	Silicon diode	D11	NOT BD MOUNTED	C2
67	1	1N5232B	5.6V Zener diode	D10		A8
68	1	1N5235B	6.8V Zener diode	D7		A8

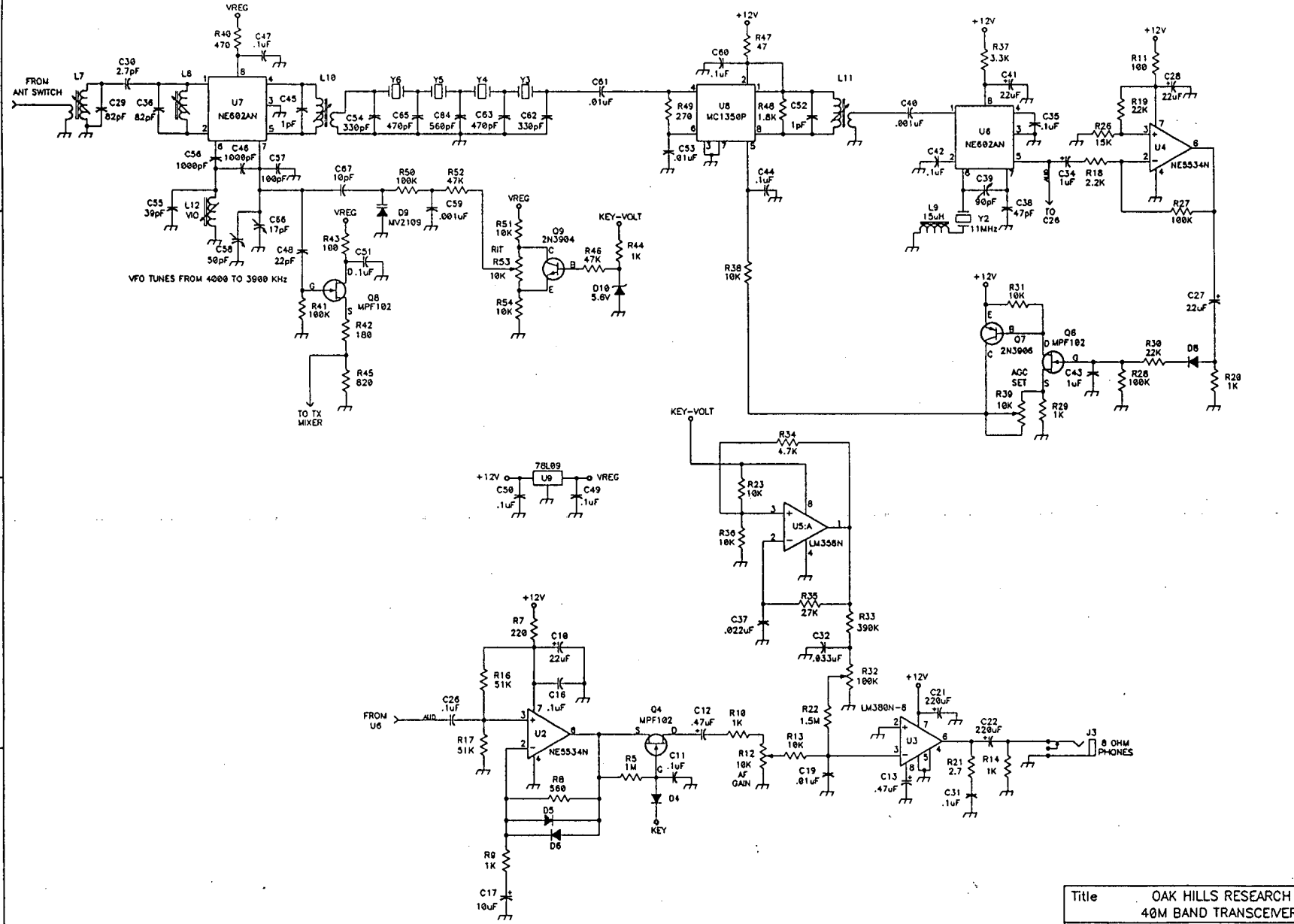
* Denotes parts in band pack

Oak Hills Research
Explorer Parts List
40M

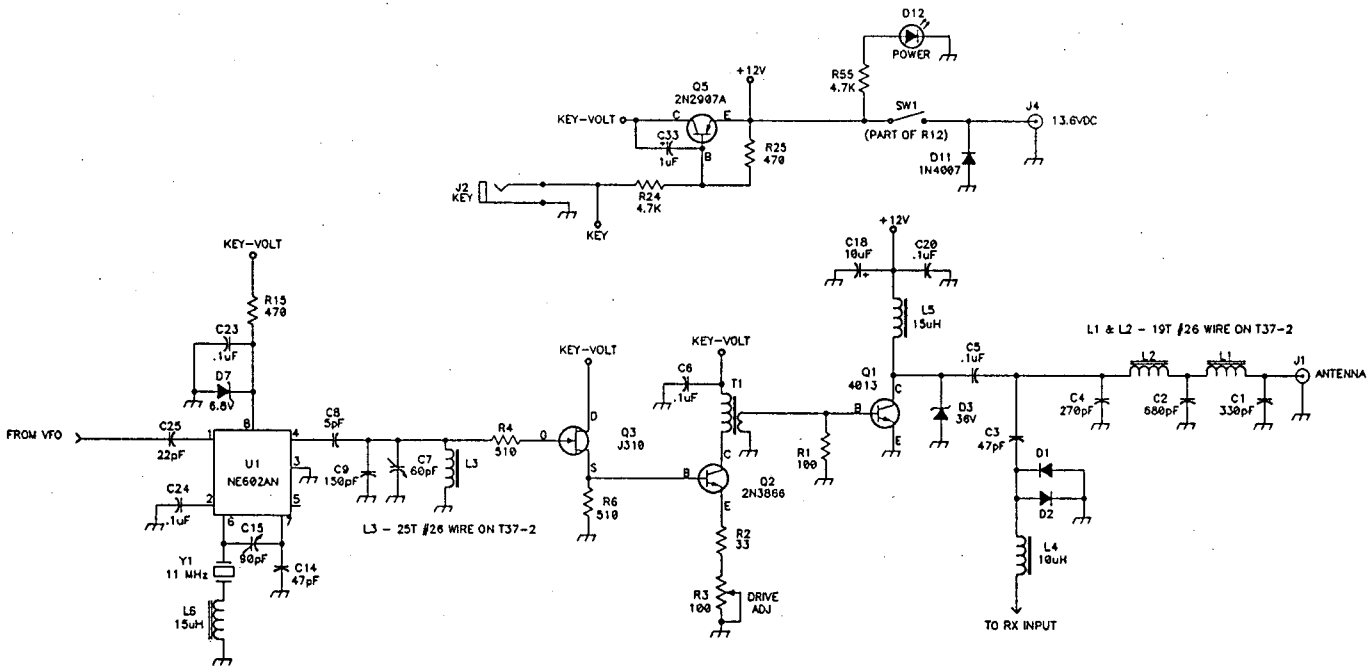
ITEM #	QTY	OHR P/N	DESCRIPTION	DESIGNATOR	MARKINGS	PART ID
113	4	K147	3/8" x 1/4" round alum spacer			D10
114	4	K132	Rubber feet			D6
115	5	K145	4" plastic tie			D2
116	1	40-165	PC board			
117	1	10-106A	Chassis bottom			
118	1	10-106B	Cover			
119	1	K006	Brass dial mount hub			D14
120	1	K165	Dial pointer			D15
121	12"	K264	10 conductor cable			
122	12"	RG174/U	Miniature coax cable			
123	2	K005	Small knob			E6
124	1	K164	Large knob			E3
125	1		Instruction set			

Oak Hills Research
Explorer Parts List
40M

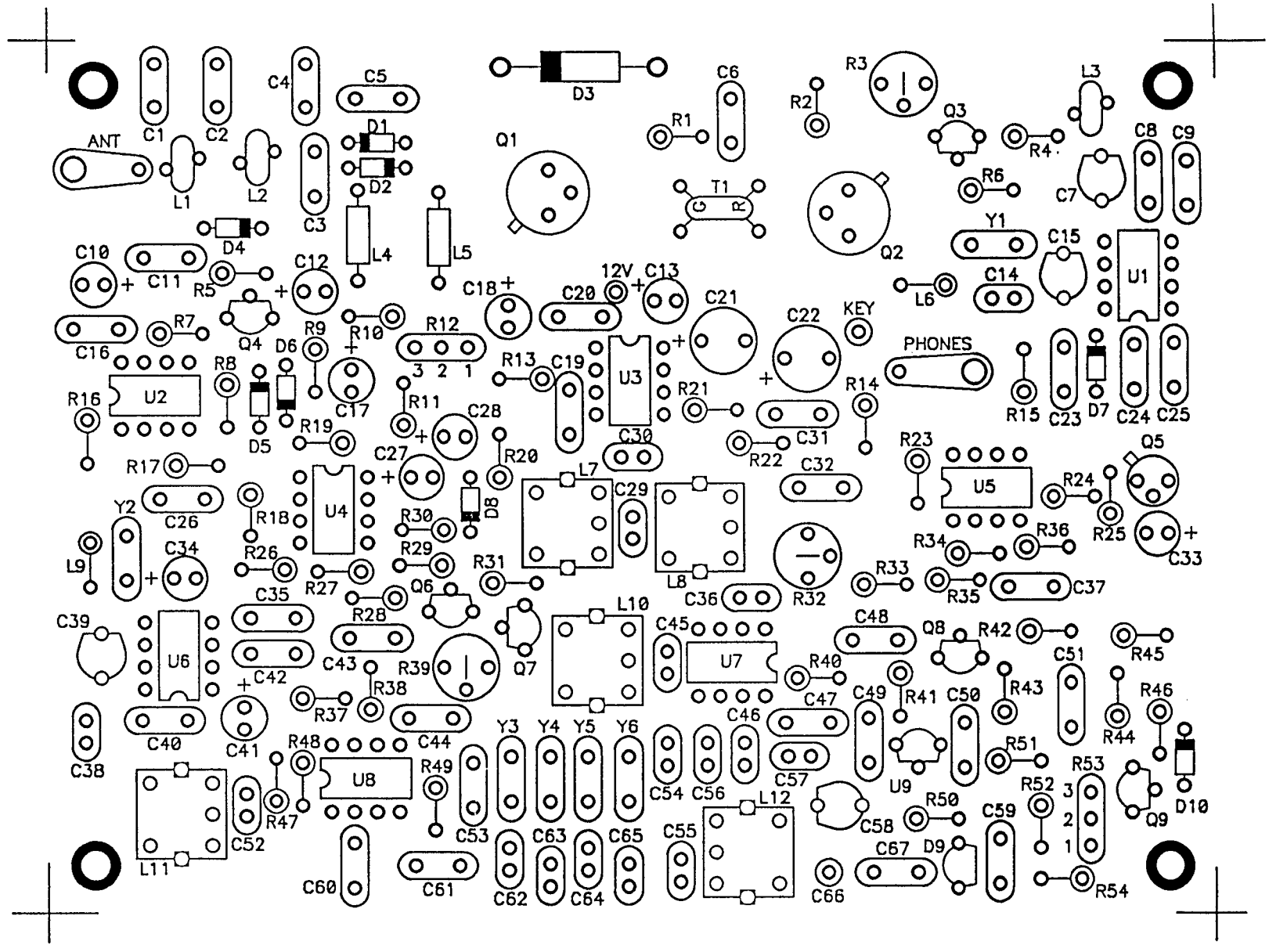
ITEM #	QTY	OHR P/N	DESCRIPTION	DESIGNATOR	MARKINGS	PART ID
91	1	POT10	100K ohm PC trim pot	R32	104	A1
92	1	K134	1 1/4" Large red wire			
93	1	K013	10K ohm center detent panel pot	R53	B10K	E5
94	1	K222	10K ohm panel pot w/switch	R12/SW1	A10K	E1
95	2	K090	1/4" standard phone jack	J2,J3		E4
96	1	K146	3 lug terminal strip			E7
97	1	K092	SO-239 connector	J1		E8
98	1	AV03	18pF air variable cap	C66	OHR-1	E2
99	1	K263	LED w/wire leads	D12		E9
100	1	K293	Coaxial power jack	J4		E10
101	1	K234	Molded power cable			E11
102	11	K162	4-40 x 1/4" machine screw			D5
103	4	K056	4-40 x 5/16" machine screw			D7
104	1	K117	6-32 x 5/8" machine screw			D3
105	4	K129	#8 x 1/4" BLK sheet metal screw			D8
106	2	K066	2-56 x 1/8" machine screw			D9
107	19	K058	#4 lockwasher			D13
108	2	K116	#6 lockwasher			D4
109	1	K004	#4 solder lug			D12
110	1	K144	#6 solder lug			D12
111	5	K059	#4 hex nut			D11
112	2	K014	#6 hex nut			D1



Title	OAK HILLS RESEARCH 40M BAND TRANSCEIVER		
Size C	Number EXPLORER RECEIVER SECTION		Rev B
Date	7/94	Drawn by	DW
Filename	40-166.S01	Sheet 1 of 2	

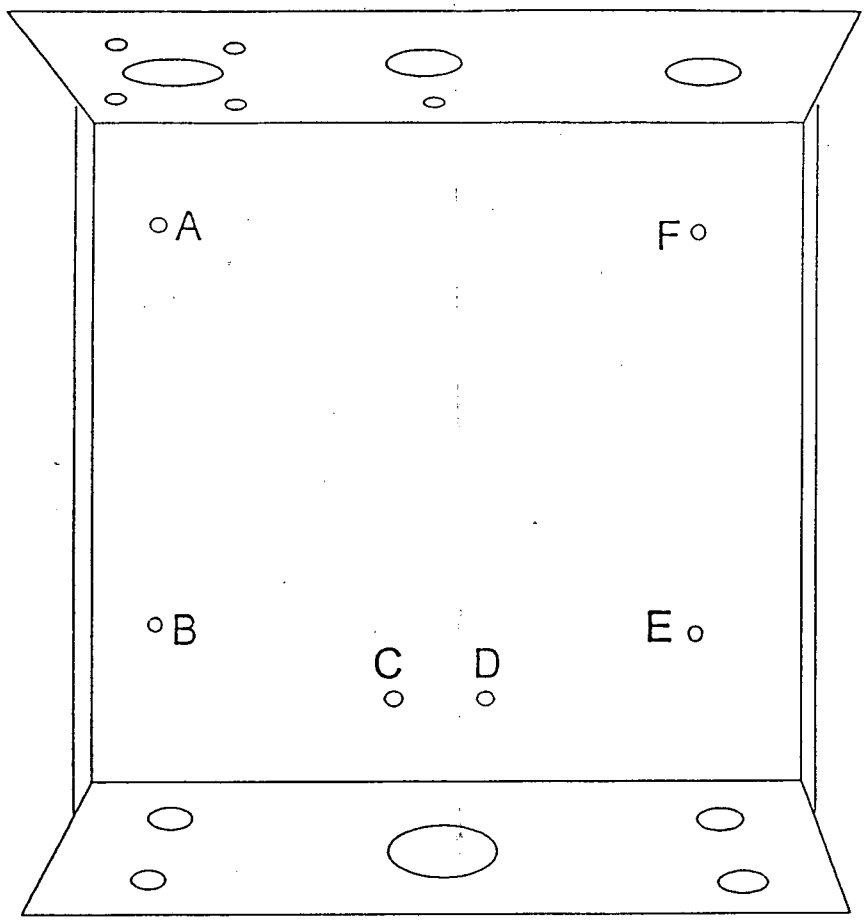


Title	OAK HILLS RESEARCH 40M TRANSCEIVER		
Size C	Number EXPLORER TRANSMITTER SEC		Rev C
Date 3/95		Drawn by	
Filename 40-166.S02		Sheet 2 of 2	



40–165
EXPLORER

Assembly Pictorial

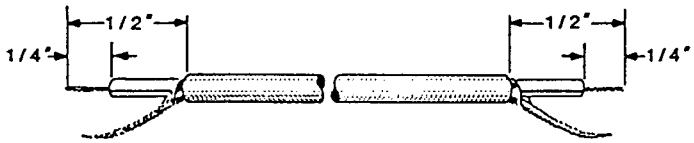


Top view of chassis

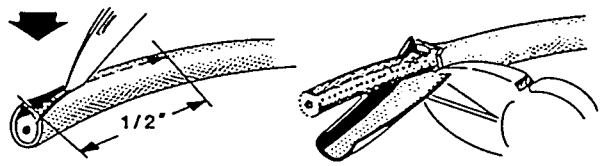
Fig 1

Assembly Pictorial

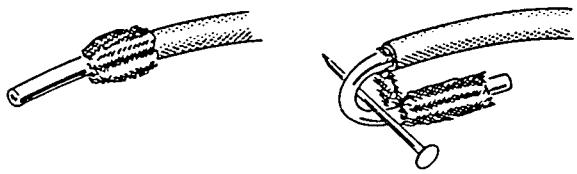
PREPARE EACH END AS SHOWN



TAKING CARE NOT TO CUT THE OUTER SHIELD OF VERY THIN WIRES, REMOVE THE OUTER INSULATION.



PUSH BACK THE SHIELD. THEN MAKE AN OPENING IN THE SHIELD AND BEND OVER AS SHOWN. PICK OUT THE INNER LEAD.



REMOVE THE INNER INSULATION AND STRETCH OUT THE SHIELD . APPLY A SMALL AMOUNT OF SOLDER TO THE END OF THE SHIELD AND THE INNER LEAD. USE ONLY ENOUGH HEAT FOR THE SOLDER TO FLOW.

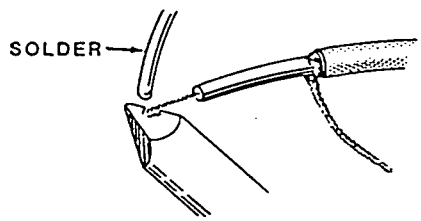
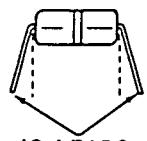


Fig 2

The pins on the IC's may be bent out at an angle, so they do not line up with the holes in the IC socket. DO NOT try to install an IC without first bending the pins as described below. To do so may damage the IC pins or the socket, causing intermittent contact.



Before you install an IC, lay it down on its side as shown below and very carefully roll it toward the pins to bend the lower pins into line. Then turn the IC over and bend the pins on the other side in the same manner.

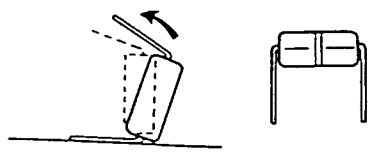


Fig 3

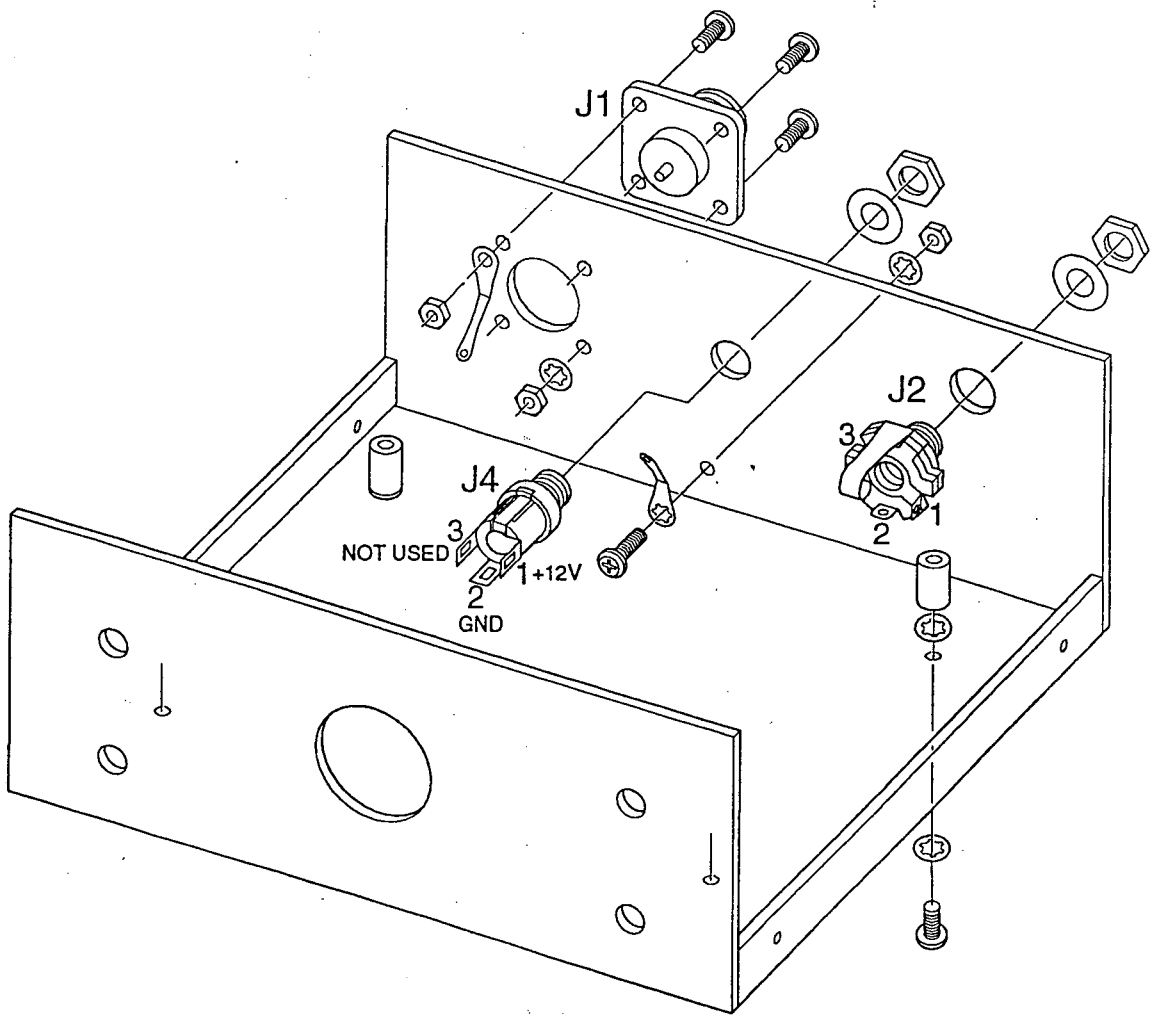


FIG 4

ASSEMBLY PICTORIAL

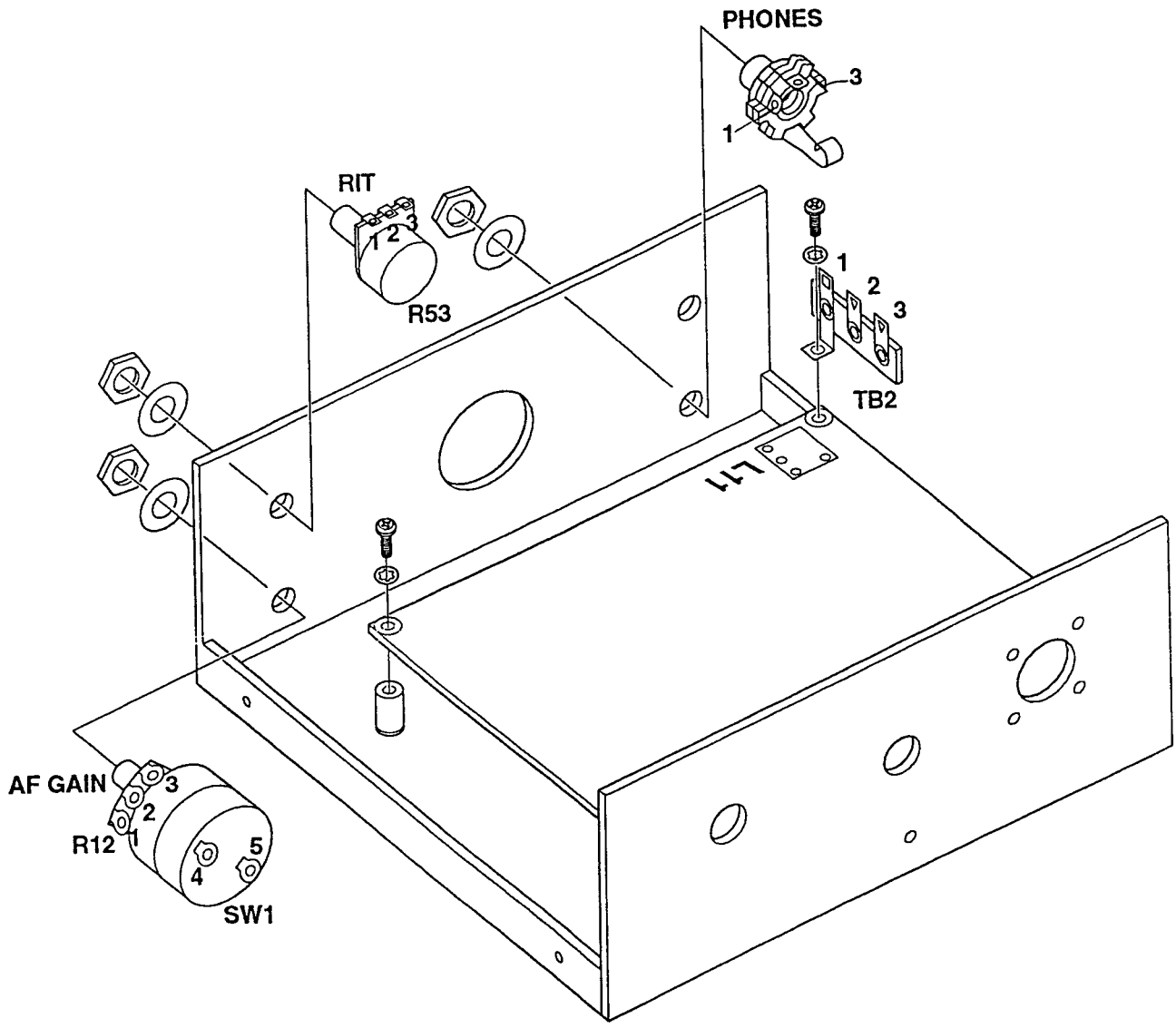


Fig 5

PARTS PICTORIAL

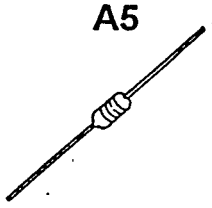
A1

A2

A3

A4

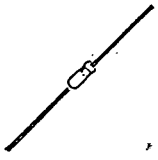
A5



A6

A7

A8



A9

A10

A11

A12

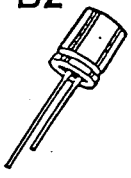
Always count the number of pins on the socket.

A13

A14

B1

B2

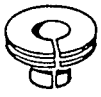


B3

B4

B5

B6



C1

C2

D1

D2

D3

D4

D5

D6

D7

D8

D9

D10

D11

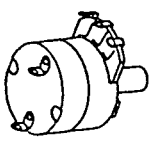
D12

D13

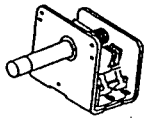
D14

D15

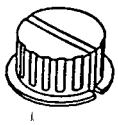
E1



E2



E3



E4

E5

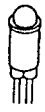
PARTS PICTORIAL

E6

E7

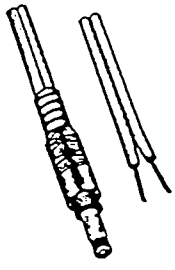
E8

E9

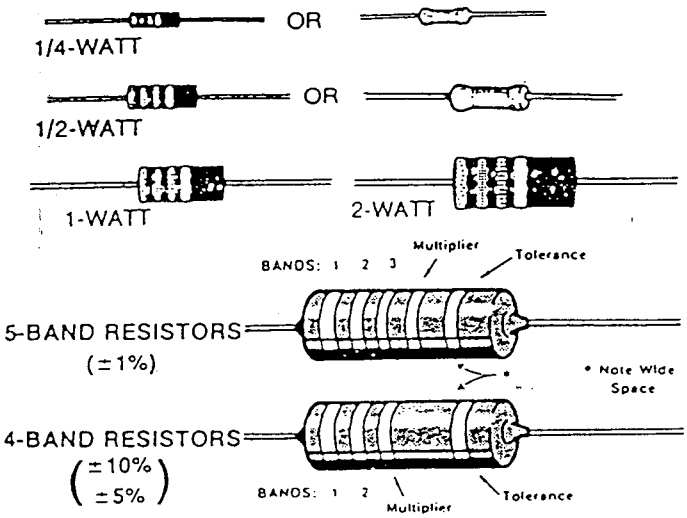


E10

E11



RESISTORS & CHOKES



Band 1 1st Digit	
Color	Digit
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Gray	8
White	9

Band 2 2nd Digit	
Color	Digit
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Gray	8
White	9

Band 3 (if used) 3rd Digit	
Color	Digit
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Gray	8
White	9

Multiplier	
Color	Multiplier
Black	1
Brown	10
Red	100
Orange	1,000
Yellow	10,000
Green	100,000
Blue	1,000,000
Silver	0.01
Gold	0.1

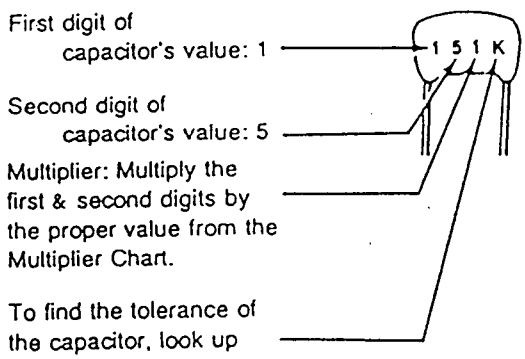
Resistance Tolerance	
Color	Tolerance
Silver	± 10%
Gold	± 5%
Brown	± 1%

EXAMPLES:

151K = 15 × 10 = 150 pF
759 = 75 ×0.1 = 7.5 pF

NOTE: The letter "R" may be used at times to signify a decimal point: as in: 2R2 = 2.2 (pF or μF).

CAPACITORS


First digit of capacitor's value: 1
Second digit of capacitor's value: 5
Multiplier: Multiply the first & second digits by the proper value from the Multiplier Chart.
To find the tolerance of the capacitor, look up this letter in the Tolerance columns.
1 5 1 K

MULTIPLIER		TOLERANCE OF CAPACITOR		
FOR THE NUMBER:	MULTIPLY BY:	10 pF OR LESS	LETTER	OVER 10 pF
0	1	±0.1 pF	B	
1	10	±0.25 pF	C	
2	100	±0.5 pF	D	
3	1000	±1.0 pF	F	±1%
4	10,000	±2.0 pF	G	±2%
5	100,000		H	±3%
			J	±5%
8	0.01		K	±10%
9	0.1		M	±20%